IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Cai Application No.: 10/784757 Filed: 02/23/2004 Title: PIM Designated Router Functioning on Behalf of Local IGMP Hosts in Multi-Access Network Attorney Docket No.: 120-334	Group Art Unit: 2153 Examiner: Phan

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APPELLANT'S REPLY BRIEF

Please enter this Reply Brief which is submitted in response to the Examiner's Answer dated September 8, 2008.

I. Real Party in Interest

As indicated in the Appeal Brief submitted June 16, 2008.

II. Related Appeals and Interferences

As indicated in the Appeal Brief submitted June 16, 2008.

III. Status of the Claims

As indicated in the Appeal Brief submitted June 16, 2008.

IV. Status of Amendments

As indicated in the Appeal Brief submitted June 16, 2008.

V. Summary of Claimed Subject Matter

As indicated in the Appeal Brief submitted June 16, 2008.

VI. Grounds of Rejection to be Reviewed on Appeal

As indicated in the Appeal Brief submitted June 16, 2008.

VII. Argument

A. Claims 1 through 9 and 16 distinguish the cited combination because forwarding a PIM prune message in response to an IGMP Leave is delayed if the Designated Router is in the upstream path from the IGMP host.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). The Office has failed to establish *prima facie* obviousness of a claimed invention because the cited combination fails to teach or suggest that forwarding a PIM prune message in response to an IGMP Leave is delayed if the Designated Router is in the upstream path from the IGMP host.

A potential problem occurs when the designated router is upstream from the IGMP host because there may be other members of the multicast group on the local network. In particular, an IGMP Leave could potentially cause the PIM entry to be deleted from the routing table even though those other devices are on the local network with the IGMP Host, i.e., devices which are still members of the multicast group. The limitations recited in claims 1, 6 and 16 help avoid this problem because the presence of such other members can be indicated by a Join received during the delay. The Office asserts that this feature is shown in Haggerty at column 19, lines 40 and 58. However, the cited passages describe both a different problem and a different solution. In particular, Haggerty

describes delaying **queries** on access ports having active senders as a technique for reducing the IGMP Active Senders problem. As stated at column 19, lines 25-32 and lines 35-36, a query is a request for an IGMP membership report, i.e., a request for Joins. The limitation recited in claims 1, 6 and 16 is not delaying a **query**, but rather delaying **forwarding a PIM prune message** in response to an **IGMP Leave** if the Designated Router is in the upstream path from the IGMP host. Although the cited passage teaches a timer, that timer determines the time during which reports must be received, rather than when a PIM prune message is sent. Consequently, the cited passage fails to show even one of the following inter-related claim limitations: (1) an IGMP Leave, (2) the Designated Router is in the upstream path from the IGMP host, and (3) delaying forwarding a PIM prune message. The Office cannot simply read these details into the reference based on the presence of a timer. The law requires that the limitations must be taught or suggested by the reference. Therefore, the Office has failed to establish *prima facie* obviousness.

Claims 2-5 and 7-9 are dependent claims which further distinguish the claimed invention, and which are allowable for the same reasons as their respective base claims. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

The Examiner's Answer asserts that "Haggerty discloses delaying the removal and forwarding by resetting the timer (col. 19, line 40); thus it causes message flow arriving are forwarded (col. 19, line 58) upstream after the delay

timer is up." The Examiner also asserts that "it affects the membership report to be restored on the sniffed port and forwarding packets to the outports/receivers (col. 19, lines 62-65)." The passages cited by the Examiner actually describe at least two completely different techniques for solving the problem. The paragraphs which include the cited passages read as follows:

> The IGMP membership report, sent in response to a query, is addressed to the group multicast address. Suppose a given host reports and that host is also a sender to the group and therefore the source of a connection to other receivers in the domain. In this case the membership report is forwarded out all those receiver's ports and hearing this report causes other hosts to reset their timers instead of responding to the local queries on their links. Switches would not know if receivers were still there. **Delaying queries** on those access ports having active senders would reduce the problem but not solve it. A switch must either (1) temporarily take down connections and throttle multicast flows to check for membership; or (2) assume membership remains and send out flows that are no longer wanted. (emphasis added)

> **Another solution** takes down connections by **"sniffing" each access port for the duration of a "query interval"** of about 10 seconds. **Sniffing walks the multicast connection table and, for any connection having that inport, substitutes the host control port for the outport(s), before sending out an IGMP query on the port.** Existing sender flows arriving on the sniffed port are forwarded through the CPU (central processing unit on the switch) rather than switched in hardware. If a new sender appears on a sniffed port the Senders' Present announcement is made to all other switches and the senders's multicast packets are forwarded by the CPU. Should membership to a given group be reported on the sniffed port, sniffed connections for that group are immediately restored to their original outports. Finally, when the query interval expires, the port is "unsniffed" and all sniffed connections are restored. (emphasis added)

In other words, Haggerty criticizes the known technique of (1) delaying the transmission of the query, and discloses a different technique of (2) sniffing for a query interval. The Examiner's response scrambles these two different techniques in an unsupportable manner by suggesting that the query interval sniffing timer is used to measure the delay in sending the query. The Examiner then asserts that delaying transmission of the query is equivalent to delaying the forwarding of a PIM prune message because in both cases there is a delay. Even assuming the unsupportable combination of the two techniques were permissible, the Examiner's argument is fatally flawed because it ignores the limitation that the delay is "in response to an IGMP Leave if the Designated Router is in the upstream path from the IGMP host." In view of these limitations it should be apparent that the operations that are delayed are different because different devices are relied upon to perform the functions. Reference is made to figure 1 of this application. The delay in forwarding a PIM prune message as recited in the claims is measured from receipt to send in the *designated router*. In the case where the query is delayed as described by Haggerty, there is no predetermined delay in forwarding by the designated router. Rather, the querying device, i.e., *the IGMP host*, delays transmitting the query. As shown in figure 1 of this application, the designated router and IGMP host are two different devices. Similarly, sniffing for a query interval is done by *the IGMP host*. This is not a trivial distinction because the claimed solution is less likely to affect other devices in comparison with delaying queries by the IGMP host, and less complex and resource intensive than sniffing at the IGMP host. In sum, delaying forwarding of

a PIM prune message at a designated router is distinct from delaying transmission of a query by an IGMP host or sniffing access ports at the IGMP host. The Examiner's counter-argument should therefore be rejected.

B. Claims 10 through 15 distinguish the cited combination by reciting not processing a PIM prune message if a local IGMP host exists.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). The Office has failed to establish *prima facie* obviousness of a claimed invention because the cited combination fails to teach or suggest not processing a PIM prune message if a local IGMP host exists.

Claim 10 recites a further method for enhancing PIM Prune handling. In particular, claims 1 through 9 and 16 recite **delaying** forwarding a PIM prune message in response to an IGMP Leave if the Designated Router is in the upstream path from the IGMP host, and claim 10 recites **not processing** a PIM prune message if a local IGMP host exists. The Office asserts that this feature is shown in Haggerty at column 19, lines 40 and 58. However, the cited passages describes both a different problem and a different solution. In particular,

Haggerty describes delaying queries on access ports having active senders as a technique for reducing the IGMP Active Senders problem. As stated at column 19, lines 25-32 and lines 35-36, a query is a request for an IGMP membership report, i.e., a request for Joins. The recited limitation is not delaying a query, but rather **not processing a PIM prune message** if a local IGMP host exists. The cited passage fails to show even one of the following inter-related claim limitations: (1) not processing a PIM prune message, and (2) if a local IGMP host exists. The Office cannot simply read these details into the reference. The limitations must be taught or suggested by the reference. Therefore, the Office has failed to establish *prima facie* obviousness.

Claims 11-15 are dependent claims which further distinguish the claimed invention, and which are allowable for the same reasons as their respective base claims. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

The Examiner's Answer asserts that figure 7A of Haggerty illustrates a step of establishing a filter (203) which is equivalent to the recited limitation of not processing the PIM prune message. The Examiner's assertion is contradicted by the text which describes figure 7A. As stated by Haggerty at column 26, lines 29-31, the function of the filter established in step (203) is "to momentarily buffer or discard subsequently transmitted **multicast packets from the source host** until network connections to receivers may be established." (emphasis added). In other words, the filter is for multicast data traffic, and has no function or effect for

PIM prune messages. Likewise, it has no function or effect for PIM query, join, and leave messages. The Examiner's counter-argument should therefore be rejected.

C. The negative limitation "not processing" recited in claim 10 does not render the claim indefinite.

The MPEP provides the following examples of claim indefiniteness: terminology inconsistent with accepted meaning; relative terms; broad and narrow range limitation in same claim; lack of antecedent basis; literal translation; means lacking function, omission of essential steps or relationships; and the introductory phrases "or the like," "such as," and "for example." There is no rule that a negative limitation renders a claim indefinite. Further, this particular negative limitation is logically as definite as a corresponding positive limitation. In other words, when a device receives an instruction, the device can either execute the instruction or not execute the instruction. In either case, the result is clear and definite. Because the Office fails to provide either clear grounds in the law for the rejection or a logical argument why the rejection is even based on the spirit of the law, the rejection is improper.

The Examiner's Answer maintains that the negative limitation is improper under MPEP 2173.05(i). The Examiner misunderstands MPEP 2173.05(i)

because it states that negative limitations *are permitted*. In particular, 2173.05(i) states:

> The current view of the courts is that there is nothing inherently ambiguous or uncertain about a negative limitation. So long as the boundaries of the patent protection sought are set forth definitely, albeit negatively, the claim complies with the requirements of 35 U.S.C. 112, second paragraph. Some older cases were critical of negative limitations because they tended to define the invention in terms of what it was not, rather than pointing out the invention. Thus, the court observed that the limitation "R is an alkenyl radical other than 2-butenyl and 2,4-pentadienyl" was a negative limitation that rendered the claim indefinite because it was an attempt to claim the invention by excluding what the inventors did not invent rather than distinctly and particularly pointing out what they did invent. *In re Schechter*, 205 F.2d 185, 98 USPQ 144 (CCPA 1953).

The Examiner mistakenly relies upon the recited language from the "older cases [that] were critical of negative limitations." The operative language from the section is "[t]he current view of the courts is that there is nothing inherently ambiguous or uncertain about a negative limitation," and "so long as the boundaries of the patent protection sought are set forth definitely, albeit negatively, the claim complies with the requirements of 35 U.S.C. 112, second paragraph." The Examiner's counter-argument should therefore be rejected.

VIII. Conclusion

Appellants submit therefore that the rejections of the present claims are improper for at least the reasons set forth above. Appellants accordingly request that the rejections be withdrawn and the case put forward for allowance.

Respectfully submitted,

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Appendix A - Claims

1. (previously presented) A method of maintaining consistent group membership data at a Designated Router executing the Protocol Independent Multicast (PIM) protocol including the steps of:

receiving, at the Designated Router, an IGMP membership message from an IGMP host operating according to the Internet Group Multicast Protocol (IGMP) protocol;

translating the IGMP membership message into a PIM membership message; and

selectively forwarding the PIM membership message to a device upstream from the Designated Router, including delaying forwarding a PIM prune message in response to an IGMP Leave if the Designated Router is in the upstream path from the IGMP host.

2. (original) The method according to claim 1, wherein the step of selectively forwarding further includes the steps of:

determining whether the designated router is upstream from the host device; and

responsive to a determination that the designated router is upstream from the host device, modifying an entry in a PIM routing table associated with the IGMP host responsive to the IGMP membership message.

3. (original) The method according to claim 2, wherein the IGMP membership message indicates that a member is joining a multicast group, and the step of modifying includes the step of generating and storing a PIM entry in a multicast routing table responsive to information in the IGMP membership message.

4. (original) The method of claim 1, wherein the IGMP membership message is a Report message, including an identifier and network interface for a member of a group, and where the step of translating translates the Report message into a PIM Join message.

5. (original) The method of claim 1, wherein the IGMP membership message is a Leave message, indicating an identifier and network interface for a member leaving a group, and wherein the step of translating converts the Leave message to a PIM Prune message.

6. (previously presented) A method of maintaining consistent group membership data at a Designated Router executing the Protocol Independent Multicast (PIM) protocol including the steps of:

receiving, at the Designated Router, an IGMP membership message from an IGMP Host device operating according to the Internet Group Multicast Protocol (IGMP) protocol;

determining whether an entry in a PIM routing table corresponds to information in the IGMP membership message;

translating the IGMP membership message into a PIM membership message; and

selectively forwarding the PIM membership message to a device upstream from the Designated Router, including delaying forwarding a PIM prune message in response to an IGMP Leave if the Designated Router is in the upstream path from the IGMP host.

7. (previously presented) The method of claim 6, wherein the step of selectively forwarding the PIM membership message operates in response to whether the entry exists in the routing table and in response to whether the designated router is upstream from the IGMP Host device.

8. (original) The method of claim 7, wherein the IGMP protocol message indicates that a member is leaving a group, and wherein the PIM membership message indicates removal of the member from the group, and wherein the method further includes the step of delaying removal of the member from the group at the designated router for a predetermined time period.

9. (previously presented) The method according to claim 6, wherein the designate router forwards the PIM membership message on the network interface on which the IGMP membership message is received.

10. (previously presented) A method of maintaining consistent group membership data at a Router executing the Protocol Independent Multicast (PIM) protocol including the steps of:

receiving a PIM membership message on a first interface, the membership message identifying a (source, group) pair;

searching a multicast routing table to determine whether an entry corresponding to the (source, group) pair and associated with a coupled IGMP Host is stored in the multicast routing table; and

selectively processing the PIM membership message responsive to whether the entry is stored in the routing table, including not processing a PIM prune message if a local IGMP host exists.

11. (original) The method according to claim 10, further responsive to whether the PIM membership message is addressed to the Router.

12. (original) The method according to claim 11, further including the step of only forwarding the PIM membership message if the PIM message is addressed to the Router and an entry is stored in the routing table.

13. (original) The method according to claim 10, further including the step of determining whether the IGMP Host is downstream from the Router.

14. (original) The method according to claim 10, further including the step of suppressing forwarding of the PIM membership message in response to the entry being stored in the routing table and the IGMP Host not being downstream from the Router.

15. (original) The method according to claim 10, further including the step of forwarding of the PIM membership message in response to the entry being stored in the routing table and the IGMP Host being downstream from the Router.

16. (previously presented) A router comprising:

a routing table, the routing table including at least two entries including information for forwarding PIM multicast messages;

a network interface for receiving messages from a neighboring device, the messages including IGMP Host messages;

translation logic for converting IGMP Host messages received from the network interface to PIM messages; and

forwarding logic for selectively forwarding the translated PIM messages to neighboring upstream devices, including delaying forwarding a PIM prune message in response to an IGMP Leave if the Designated Router is in the upstream path from the IGMP host.

Appendix B - Evidence Submitted

None.

Appendix C - Related Proceedings

None.